Ligamentous Articular Strain: An Introduction

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“We suffer from two causes, the want of supply and the burden of dead deposits.”

A. T. Still
Human Body
Approximately 70% water
Self contained
All biochemical processes are dependent on the universal solvent, water.
oxygen
nutrition
growth
communication
A.T. Still’s Fluid Model

- Controlled by neurologic model
- Essential for proper nutrition on a cellular level
- All aspects of supply and return must function effectively to allow viscera to function and assist in the prevention of disease
FLUID MODEL

Poor Circulation Implies:
- decreased oxygen tension
- decreased nutrients
- decreased reticuloendothelial elements
- stasis

sets the stage for infection and disease
* Fascias: The Basis for Health and Disease
* "The fascia is the place to look for the cause of disease and the place to consult and begin the action of remedies in all diseases" AT Still
* Functions:
  * Packaging - divide the body into compartments
  * Protection - stabilize structures and establish limits of motion
  * Posture - contain proprioceptors that sense movement
  * Passageways - passages for somatic and autonomic nerves and arterial, venous, and lymphatic vessels

* FLUID MODEL
Symptoms indicating soft tissue dysfunctions or disease:

* somatic dysfunction
* cellular changes
* fascial dysfunction
* respiratory changes
* postural changes
* systemic changes

FLUID MODEL
**Somatic Dysfunction:**

* Impaired or altered function of related components of the somatic system: skeletal, arthroidial, and myofascial structures, and related vascular, lymphatic and neural elements.

* Occurs first, before there are irreversible changes of pathology and/or before the disease process occurs.

**FLUID MODEL**
* **Cellular Changes:**
  * First evidence of cellular dysfunction appears in the interstitial fluids of the body and this soon affects the myofascial tissues.
  * These tissues can be treated by osteopathic manipulation, thus preventing progression to overt disease.

* **FLUID MODEL**
*Fascial Dysfunction:*
  * Revealed by abnormal total body fascial patterns and regional motion preference in soft tissues.
  * Also revealed by tissue congestion at specific terminal lymphatic drainage sites
  * Affects nerve supply, blood supply, and lymphatic drainage

*FLUID MODEL*
Treatment Using Fluid Model:

* Reduces fascial torsions to facilitate lymphatic return, venous return, and arterial and neural supply
* Removes obstruction to lymphatic flow
* Stimulates the movement of lymph

FLUID MODEL
* Fascia is connective tissue made up of fibroblasts, fibroglia, collagen fibrils, and elastic fibrils.
Fascia envelops every organ, muscle, and even tissue down to the cellular level.
Fascias anchor to bony structures and form “tough sheets” that divide the body into compartments.
* Packaging - They divide the body into compartments.

* Protection - They stabilize structures and establish limits of motion.

* Posturing - They contain proprioceptors that sense movement.

* Passageways - Arteries, veins, nerves, and lymphatics pass through them.

* Function of Fascia
BIOMECHANICS OF FASCIA AND LIGAMENTS

* Elastic
* Plastic

A) Collagen fibers with recoil

B) Effects of immobilization on connective tissues
A) Elastic Model

Pre Load

Tensile Force

Post Load
B) PLASTIC (VISCOUS) MODEL

1. PRE LOAD

2. TENSILE FORCE

3. POST LOAD
Some elongation is lost and some is retained after the application of tensile force
STRESS (FORCE/UNIT AREA)

<--- STRAIN (Δ LENGTH/INITIAL LENGTH) --->
Figure 3-12 A. Elongation of connective tissue (strain) plotted against time. B. Repeated elongations of connective tissue (strain) plotted against time. Source: Reprinted from Myofascial Manipulation: Theory and Clinical Management (pp 5–6) by AJ Grodin and R Cantu with permission of Forum Medicum Inc., © 1989.
Crosslinking of newly synthesized collagen fibers

*Trauma or Immobilization of Collagen

* Crosslinking of newly synthesized collagen fibers
Figure 4-2  Electron micrograph of normal ligament (left) and healing scar at 2 weeks (right). Source: Reprinted from *Injury and Repair of the Musculoskeletal Soft Tissues* (p 112) by SL-Y Woo and JA Buckwalter with permission of the American Academy of Orthopaedic Surgeons, © 1987.
*CYCLE OF FIBROSIS AND DECREASED MOBILITY*

Figure 4-5 Cycle of fibrosis and decreasing mobility.
Principles of Treatment

* Disengagement
  * In cases where osseous structures have become impacted due to forceful approximation or excessive membranous tension.
  * Separate opposing surfaces before attempting to secure balance
A flexion dysfunction means the segment will move into flexion and is restricted in extension.
* Be aware of this difference since palpatory findings may be described either by the dysfunction or the restriction.
Ligamentous articular strain techniques are very simple, so do not complicate them, these treatments were taught to Sutherland by Still so they probably constitute the original osteopathy. A.T. Still rarely described his techniques. Rather, he described his method.

General Principles
1. Disengagement

2. Exaggeration

3. Balancing and maintaining that balance until release occurs

THREE STEPS FOR LAS
* to disengage you have to:
  * compress (push)
  * or
  * decompress (pull) it.

* 1. Disengagement
*Disengagement*

*In cases where osseous structures have become impacted due to forceful approximation or excessive membranous tension.*

*Separate opposing surfaces before attempting to secure balance.*
* Exaggerating the injury means first taking it back to the place injury.

* So all you have to do is find this point of injury and slightly exaggerate the injury by compressing the joint or decompressing it, then bring it to where it was driven to when it was injured. There is where you will find your balance point.

* 2. Exaggeration
* If the big toe was stubbed, that means that the joint was pushed together. To exaggerate that injury you have to compress the joint more than it was done when it was originally done.

* EXAMPLE
*The point of balance of an articular surface from which all the motions physiologic to that articulation may take place.

*Balance Point or Position
You have not yet done a thing to treat the injury.

Treating the injury begins by treating the balance point.

The previous two steps were all performed to set up the situation.

You balance all the pull elements (all of the ligaments, all of the strains, all of everything).

Sometimes getting the tissue in balance does require a lot of force or a little force depending on the injury.

3. Balance Point
You are only a catalyst; you are not making the change. There is a delicate level of pressure that can be tolerated. This is the balance point.

*REMEMBER!*
If you exceed this level, the patient will not tolerate the pain and guarding will hinder the treatment.

*BALANCE POINT*
Balance is not cramming beyond the tissue’s elastic limits, and yet it is not touching light as a butterfly.

A vital resilience is still present in the tissue, yet enough pressure is applied to accomplish a release.

The key to successful treatment to any part of the body is this delicate balance.

*BALANCE POINT*
The diagram illustrates the stress-strain relationship with elongation.

- **Toe region**: Pre-elastic range, Slack range
- **Elastic region**: Elastic range, Physiological range
- **Plastic region**: Initially, molecular displacement leading to microtears and complete rupture; Loss of mechanical properties
*LAS of the Lower Extremity
*The Foot*
*Plantar Fascia Technique*
Contact the plantar fascia at the level of the tarsal-metatarsal junction. Direct pressure toward the sides of the foot and slightly toward the toes.
* Metatarsals, Tarsals, and Toes Technique
Figure 4.4 Metatarsals, tarsals, and toes technique

1. The foot rests on the table for support.

2. Grasp the toes.

3. The force is straight down into the table.
*Plantar Flexors of the Foot and Calf*
1. Compress the bands of muscle that feel tight.
2. Apply slight traction inferiorly.
The Knee
Figure 4.18 Cruciate ligaments technique

1. Press down on the femur and tibia.
2. Compress the knee joint.
3. Move the tibia into internal or external rotation to a balance point.
*The Foot
Plantar Fascia Technique
Figure 4.1 Plantar fascia technique

Contact the plantar fascia at the level of the tarsal-metatarsal junction. Direct pressure toward the sides of the foot and slightly toward the toes.
Metatarsals, Tarsals, and Toes Technique
1. The foot rests on the table for support.

2. Grasp the toes.

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Plantar Flexors of the Foot and Calf
Figure 4.10 Plantar flexors of the foot and calf technique

1. Compress the bands of muscle that feel tight.
2. Apply slight traction inferiorly.
The Knee
1. Press down on the femur and tibia.
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